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noon, with R. T. Haslam, Massachusetts Institute of Technology, as chairman.

The Section of Chemical Education is desirous of being an open forum for settling national questions in chemical education including high school, college, university and industry problems. Bring your problem for discussion. A fifty-word abstract of all papers is required before the paper is presented at the meeting.

The Cellulose Section plans a number of discussions on special topics, such as: (a) Cooperative research problems in cellulose chemistry. (b) The nature of oxycellulose and its bearing on the artificial silk, viscose and paper industries. (c) Dr. Tingle's proposed "Bromine number." (d) Absorption of salts by cellulose.

THE SOUTHWESTERN DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE third annual meeting of the Southwestern Division, American Association for the Advancement of Science, will be held in Santa Fé, New Mexico, on September 6 to 9 inclusive. It will immediately follow the annual Santa Fé Fiesta.

Three afternoons will be devoted to field meetings; one to a large fossil bed containing remains of extinct animals; another to the ruins at Pecos; and the other to the cliff dwellings at the Rito de los Frijoles, under the direction of Dr. E. L. Hewett.

The Santa Fé museums offer a special archaeological and Indian program on the evening of the sixth. The address of the president, Dr. D. T. MacDougal, will be followed by a reception. On the evening of the seventh, the friends and associates of Mr. Springer will present to the State of New Mexico a bust of him, in appreciation of his work in the advancement of science and education.

The scientific papers will be read before five sections:

Physical science: Chairman, Dr. A. E. Douglass, University of Arizona and director of the Stewart Observatory.

Social science: Chairman, K. M. Chapman, artist of the Archeological Museums, Santa Fé.

Biology: Chairman, Dr. E. C. Prentiss, El Paso.

Agriculture: Chairman, Dr. H. L. Kent, president of the New Mexico College of Agriculture and Mechanic Arts, Mesilla Park.

Education and psychology: Chairman, Dr. B. F. Haught, professor of psychology, University of New Mexico.

We wish to extend a cordial invitation to attend this meeting to all members of the association who are spending the summer in the west.

ELLIOTT C. PRENTISS,
Chairman of the Executive Committee

SCIENTIFIC NOTES AND NEWS

PROFESSOR MANGIN, director of the Paris Museum of Natural History, presided over the meeting of the French Association for the Advancement of Science held at Montpellier from July 24 to 29.

SIR JOSEPH J. THOMSON, master of Trinity College, Cambridge, was presented on July 26 with the Franklin Medal by the Franklin Institute of Philadelphia for his "signal and eminent service in science." The presentation was made by the Earl of Balfour.

THE Charles P. Daly Medal for 1922 was presented to Sir Francis Younghusband, president of the Royal Geographical Society, at the American Embassy in Great Britain on July 19 by George Harvey, the American ambassador, on behalf of the American Geographical Society. The medal was inscribed "For explorations in northern India and Thibet, and for geographical publications on the Asiatic and African borders of the empire."

At its commencement in June, Randolph-Macon College conferred the honorary degree of doctor of laws upon Rear Admiral David Watson Taylor, chief constructor, United States Navy, in recognition of his international reputation as a naval architect and his distinguished services to his country. The occasion was the near approach of his retirement from active service. Admiral Taylor is a native of Louisa County, Virginia, and was a student of Randolph-Macon College before entering upon his special training for the navy.

THE degree of doctor of science has been conferred by the University of Manchester on Mr. G. H. Hardy, Savilian professor of geometry and fellow of New College, Oxford, and

on Sir E. J. Russell, formerly lecturer in chemistry at Owens College, Manchester.

THE doctorate of laws has been conferred by the University of St. Andrews on Sir Peter Bedford Scott Lang, emeritus professor of mathematics in the university; Dr. Arthur Lapworth, professor of organic chemistry in the University of Manchester; Dr. Charles Robertshaw Marshall, professor of materia medica in the University of Aberdeen; and Sir Harold Jalland Stiles, regius professor of clinical surgery in the University of Edinburgh.

M. ALBERT RECOURA, professor at Grenoble, has been elected a correspondent of the Paris Academy of Sciences, to fill the vacancy caused by the death of M. Ernst Solvay.

DR. LEGRY, professor of anatomy in the Paris School of Medicine, has been elected a member of the Paris Academy of Medicine in the place of the late M. Ranvier.

IN accordance with an act of the California legislature, a commission of agricultural education has been appointed by the governor to formulate the needs of agricultural teaching and research in California and report to the next legislature. This commission consists of A. C. Hardison, who succeeds the late G. Harold Powell, G. H. Hecke, H. A. Jastro, Senator S. C. Evans, Mark Grimes, R. N. Wilson and Elwood Mead.

DR. HENRY B. WARD, of the University of Illinois, will conduct investigations for the Bureau of Fisheries of the pelican in relation to the fishes of the waters of Yellowstone National Park, with the view of ascertaining to what extent these birds prey upon the fish and whether or not they serve as hosts for the parasite which infests many of the trout of the park waters.

B. LINEBURG, a graduate student at the Johns Hopkins University, has been appointed by the U. S. Department of Agriculture for the summer to conduct work on the responses of bees to lights of various wave lengths and intensities.

THE Rockefeller Foundation has sent a hookwork commission to Honduras. One of its members, Dr. D. B. Wilson, accompanied by

Dr. Brizzio, director of public health, has already visited several towns.

DR. CHARLES H. GILBERT, accompanied by Willis H. Rich and W. P. Studdert, sailed from South Bellingham, Wash., on June 1 for the purpose of making a thorough investigation of the Alaska Peninsula Fisheries Reservation to determine whether the present regulations are adequate to keep the fisheries of that district in perpetuity.

PROFESSOR H. H. WHETZEL, who has been for fifteen years head of the department of plant pathology of the College of Agriculture of Cornell University, retired on July 1 from the administrative headship in order to devote his time and energies more fully to teaching and research together with the immediate preparation of one or more text-books. Dr. L. M. Massey, who has been acting head for the past year during Professor Whetzel's absence in Bermuda, succeeds to the permanent position. A correspondent writes: "Cornell was the first American University to establish an independent department of plant pathology and this stands, doubtless, at present as the largest development in its field. It is noteworthy when the leader of a flourishing department like this voluntarily retires from the administrative headship while still in his prime."

PROFESSOR B. M. KOZOT-POLJANSKI, of Dorpat University, Russia, has requested American botanists to exchange papers with him, in order that he may come in touch again with American work. His present address is University Botanical Institute, Woronesh, Russia.

AT a meeting of the Société Mathématique de France in the Sorbonne on July 12, Professor Edward Kasner, of Columbia University, spoke on "Problèmes de géométrie dans la théorie de gravitation Einsteinien."

PROFESSOR G. ELLIOT SMITH, F.R.S., and Professor J. T. Hunter described a reconstruction of the Piltdown skull at a meeting of the Royal Anthropological Institute on June 13.

PROFESSOR C. LLOYD MORGAN, Bristol, has been selected to deliver the Gifford Lectures in the University of St. Andrews in 1922-23

and 1923-24. His subject will be "Evolution, emergent and creative." The first course will begin about the end of next October.

IN memory of the late Dr. Howard M. Fussell, friends, officers and students of the Medical School of the university, have presented his portrait to the university. The formal presentation was made by Dr. David Riesman and the portrait was accepted on behalf of the university by the acting provost, Dr. Josiah H. Penniman. Dr. James M. Anders presided.

THE Mérida branch of the Mexican Medical Association will hold a medical contest in honor of Pasteur. The prizes will consist of medals and diplomas to local physicians who submit the best papers on local diseases and means of control. The prizes will be awarded on December 27, the centenary of Pasteur's birth.

THE portrait medallion of Sir Norman Lockyer, by Sir Hamo Thornycroft, at the Norman Lockyer Observatory, Salcombe Hill, Sidmouth, was unveiled by Sir Frank Dyson, astronomer royal, on July 22.

DR. JOKICHI TAKAMINE, who established the Takamine Research Laboratory at Clifton, N. J., known for his work on diastatic ferments and the active principles of the suprarenal glands, died on July 22. Dr. Takamine was born in Tokyo in 1854.

DR. SIMON NELSON PATTEN, from 1888 to 1917 professor of political economy in the University of Pennsylvania, known for his contributions to economics, including the relations of the natural sciences to sociology, died on July 25, aged seventy years.

THE Honorable Huia Onslow, known for his work on the relations of biochemistry to genetics which he carried on in his private laboratory at Cambridge, has died at the age of thirty-two years.

THE sum of \$40,000 has been donated to St. Luke's Hospital, Chicago, by Mrs. John J. Borland in memory of her husband. This fund is to endow a fellowship for clinical investigation and is to be under the immediate supervision of Dr. Joseph A. Capps.

THE late Prince of Monaco has bequeathed sums of one millions francs each to the Academy of Sciences, the Academy of Medicine, the Institut Océanographique, the Institut de Paléontologie Humaine of Paris, and the Musée Océanographique of Monaco.

TEN government departments have appointed representatives on an advisory committee on governmental broadcasting formed at the request of Secretary Hoover to make recommendations on the distribution of government information by radio. A preliminary classification of the kind of information that should be broadcasted from various stations is being made. The committee will meet at frequent intervals to consider the questions that arise through the progress of radio. Dr. S. W. Stratton, director of the Bureau of Standards, is chairman.

AN Associated Press despatch from Moscow states that after a month's negotiations, Leo Kameneff, the acting premier, has definitely refused the American Relief Administration's conditions for feeding the Russian intellectuals as a class. The Commonwealth Fund offered to send food packages to the value of approximately \$250,000 to Russia for distribution by the Relief Administration among professors, teachers, doctors, scientists and others selected by the relief authorities. The latter were ready for the government to cooperate in the distribution, but insisted that the final decision as to what persons should receive the packets should rest with the Relief Administration. The government, according to M. Kameneff, is willing to permit the Relief Administration to veto any of the government's selections of beneficiaries, but it is not willing that any outside organization be permitted to assist persons despite a Soviet veto.

THE first meeting of the newly formed Association of Maine Geologists will be held on August 11 in Auburn and Lewiston. Professor Frank D. Tubbs, of Bates College, N. B. Tracy, of Auburn, L. C. Bateman, of the *Lewiston Journal*, and other members of the local committee have arranged a program that will take in all the points of geological interest in the vicinity. These include Mt. Apatite, the source

of much of the feldspar, and of many of the Maine gems and a large variety of minerals; the Lewiston Falls and a number of other localities. It is hoped that the geologists from other parts of New England will take part in the meeting, and it is expected that Professor George P. Merrill, curator of the National Museum at Washington, will deliver an address in the evening. The headquarters of the association will be at the Auburn Chamber of Commerce.

UNIVERSITY AND EDUCATIONAL NOTES

BOWDOIN COLLEGE receives \$500,000 under the will of the late Edward H. Blake, of Bangor.

PHILIP A. LEHENBAUER, professor of plant pathology at the University of Illinois, has accepted a position as head of the department of horticulture at the University of Nevada.

DR. FREDERICK C. LEONARD has been appointed instructor in astronomy and mathematics, in charge of the work in astronomy, at the Southern Branch of the University of California in Los Angeles.

PROFESSOR BENJAMIN A. WOOTEN, Ph.D., head of the department of physics at the Alabama Polytechnic Institute, has been elected professor of physics at Washington and Lee University, in the place of Dr. Walter LeConte Stevens, who has been retired and made professor emeritus.

LELAND H. TAYLOR, who received the degree of doctor of science from Harvard in 1922, has been elected to an instructorship in zoology in West Virginia University.

DISCUSSION AND CORRESPONDENCE

CONCERNING THE BOTULINUS TOXIN

RECENTLY Bronfenbrenner and Schlesinger¹ have reported the death of laboratory animals (mice) as a result of the intraperitoneal injection of 3×10^{-21} cc of a solution of the toxin of *B. botulinus*. In a preliminary communica-

tion² concerning the matter they state that under suitable "conditions of the experiment the *botulinus* toxin which ordinarily kills mice in amounts not smaller than 3×10^{-7} cc can be increased in potency to such an extent that 3×10^{-21} cc occasionally and 3×10^{-18} cc quite regularly kills mice of 18-20 g. in less than 48 hours after intraperitoneal injection. While the total solids of such a minute dose of toxin amounts to only 3×10^{-23} g (this amount also includes the inorganic portion of the medium), the toxic product thus obtained, nevertheless, possesses all the essential characteristics of bacterial toxins," etc.

Because of the smallness of the quantity it seemed worth while to examine some of the consequences involved. Since a gram molecule of any compound contains 6.06×10^{23} molecules then one gram of water or approximately 1 cc would contain $1/18 \times 6.06 \times 10^{23} = \frac{10^{23}}{3}$ molecules and 3×10^{-21} cc would contain $\frac{10^{23}}{3} \times \frac{3}{10^{21}} = 10^2$ molecules

From the quotation given it is apparent that the solution of toxin can not be even a one per cent. solution, but assuming that it is a one per cent. solution and that the molecular weight and density of the pure toxin are the same as those of water then 3×10^{-21} cc would contain only one molecule of toxin. However, the molecular weight is probably higher than that of water and not even one molecule in a hundred would be a toxin molecule. Consequently the average 3×10^{-21} cc quantity of solution would contain no toxin. If one takes the larger quantity, 3×10^{-18} cc, which quite regularly kills mice, and assumes that the molecule has ten times the molecular weight of the water molecule then one hundred molecules of toxin would be present.

In the case of the smaller quantity it is unlikely that at best more than one or two molecules of toxin could have been present and since the animal was killed one seems forced to conclude that the life of an organism is dependent upon the integrity of one or two cells or that the action of the toxin is catalytic and

¹ *Journal American Medical Assn.*, 78: 1519 (1922).

² *Proceedings Society Exper. Biology and Medicine*, 19: 1 (1921).